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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/517,674	05/26/2005	Tom Hartley	UA.439	1930

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EXAMINER	
DIAO, M BAYE	
ART UNIT	PAPER NUMBER
2112	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/04/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/517,674	HARTLEY ET AL.	
	Examiner	Art Unit	
	M'baye Diao	2112	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 May 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 May 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Priority

Specification

1. The disclosure is objected to because of the following informalities:

Part of the text is missing or illegible on page (page 21, line 4).

The word " life o the cell " should read -- life of the cell -- (page 48, line 17).

Appropriate correction is required.

Claim Objections

1. Claim 12 is objected to because of the following informalities:

The word " said measure output " should read -- said measured output--.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. **Claims 4 is rejected under 35 U.S.C. 102(b) as being anticipated by Yoon et al., (Yoon) US PAT 6,160,382.**

4. As per claim 4, Yoon discloses (col. 2, lines 47-56; col. 7, lines 11-67; col. 8, lines 1-56) and shows in Fig. 4 above, a method and apparatus for characterizing internal parameters of a charge storage device based on a wide frequency range of

impedance measurements and a non-linear equivalent circuit model of the charge storage device, comprising:

a control means (10) (applicant's simulation processor) receiving an input signal thru the A/D converter (80) sent to the electrical storage device (20) via the D/A converter (30).

Yoon also discloses that the control means (10) can use a separate voltage/current generator to charge the storage device (20) directly, so that the voltage/current generator outputs predetermined voltage and current, charging the charge storage device under the control of the control means (10), thus meeting the limitations of modeling a plurality of states of the electrical storage device and generates an estimated output signal so that the controller mitigates damage of the electrical storage device.

Accordingly claim 4 is anticipated.

Claim Rejections - 35 USC § 103

5. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoon et al., (Yoon) US PAT 6,160,382 in view of Yamamoto et al., (Yamamoto) US PAT 4,360,762.

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. As per claim 1, Yoon discloses (col. 1, lines 7-14, 66-67; col. 2, lines 1-6,57-67) and shows in Fig. 4, a method and apparatus for determining characteristics parameters of a storage charge storage device including:

a non-linear equivalent circuit model for the charge storage device (20), thus meeting the limitation of developing an essentialized cell model structure of the electrical device;

the method includes measuring voltage and current characteristics by applying a voltage/current having a predetermined discharge rate to the capacitor (20), thus meeting the limitation of determining models parameters for charge-discharge data of said structure. Yoon also discloses (col. 8, lines 36-48) the voltage/current characteristics measuring means (15) to measure the current and voltage of the charge storage device (20).

Yoon differs from the claimed invention because he does not specifically disclose the determining charge-discharge behavior in a voltage-charge plane. Although Yoon

discloses the capacitor (20) to be a non-linear device, he did not disclose the characteristics on a voltage charge plane.

Yamamoto discloses (abstract) a non-linear capacitor (3) (applicant's storage device) and shows in Fig. 2A the saturation characteristics of the non-linear capacitor on voltage-charge plane.

Yamamoto is evidence that ordinary skill in the art would find a reason, suggestion or motivation to use the characteristics of the non-linearity of the capacitor, charge storing device, such as to understand the saturation and the charging and discharging of the electrical storage device.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Yoon by using the characteristics curve of the non-linearity of the capacitor for advantages such as, understanding the saturation and the charging and discharging of the electrical storage device as per the teachings of Yamamoto.

As per claims 2 and 3, Yoon discloses (col. 1, lines 38-57; col. 2, lines 43-67) the method includes analyzing the operational characteristics by examining and analyzing the internal parameters related to the mechanism of the storage device as well as average discharge voltage, discharge voltage profile, internal resistance, temperature characteristic and charge cut-off voltage (applicant instantaneous damaged rate).

FIG. 1

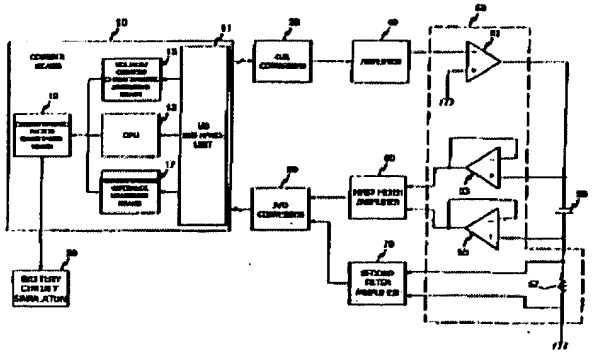
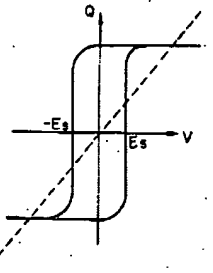


Fig. 2A



Accordingly claims 1-3 would have been obvious.

9. **Claims 5-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoon in view of Gartstein et al., (Gartstein) US PAT 6,118,248.**

10. As per claim 5, Yoon differs from the claimed invention because he does not specifically disclose that the CPU (13) (applicant' processor) being comprised of a feed back component.

Gartstein discloses (col. 33, lines 41-67) and shows in Figs. 4B, 4C, and Fig. 7, a battery (110,730) (applicant electrical storage device) utilizing an embedded controller circuit (140) (applicant simulation processor) method and apparatus for determining characteristics parameters of a storage charge storage device comprising a charge sub-controller which may optimize the charge of each cell based on actual feedback from that particular cell in order to maximize the number and efficiency. He also discloses (col. 25, lines 59-67) that the pulse-width modulation whose output voltage (applicant's measured output voltage) is continuously sampled and compared to a reference voltage and that the error correction signal is used to alter the duty cycle of the DC/DC converter. He further discloses that the negative feedback loop from the output voltage

at the terminals of the electrochemical cell (730) (applicant's storage device) allows the converter (750) to provide a stabilized output voltage and furthermore he discloses (col. 23, lines 50-56) that the battery of the present invention also include a low remaining charge warning to the user.

Gartstein further discloses (col. 13, lines 14-28; col. 14, lines 4-11;col. 26, lines 1-8) that the embedded controller (140) comprising of the discharge sub-controller circuit (102), and/or the charge sub-controller circuit (104) based upon continuously or intermittently sensed operating parameters and/or physical conditions (applicant's plurality of modeled dynamic states) of the electric storage device.

Gartstein is evidence that ordinary skill in the art would find a reason, suggestion or motivation to use the negative feedback loop from the output voltage at the terminals of the electrochemical cell in order to allow the converter to provide a stabilize output voltage.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Yoon by using the negative feedback loop from the output voltage at the terminals of the electrochemical cell in order to allow the converter to provide a stabilize output voltage as per the teachings of Gartstein.

Accordingly claim 5 would have been obvious.

11. As per claim 6, Yoon differs from the claimed invention because he does not specifically disclose the control means (10) comprising of a feedback component, which generates a correction signal wherein, said correction signal represents a real time estimate.

Gartstein discloses (col. 13, lines 14-18; col. 14, lines 4-11;col. 26, lines 1-8) that the embedded controller (140) comprising of the discharge sub-controller circuit (102), and/or the charge sub-controller circuit (104) based upon continuously or intermittently sensed operating parameters and/or physical conditions, an emergency disconnect sub-controller circuit (106) whose function is to preferably disconnect the electrochemical cell(s) from the battery terminals when the sensing circuit detects an unsafe condition, and a sensing circuit (105) which may measure operating parameters of the electrochemical cell (130) such as the cell voltage, current drawn from the cell, current etc. He further discloses (col. 14, lines 33-37) that the charge sub-controller (105) minimizes losses by utilizing the instantaneous charge value of the cell(s) and the maximum capacity of the cell to continuously optimize the charging conditions, thus meeting the limitation of said correction signal represents a real time estimate of the amount of damage being done to the electrical storage device during re-charging.

Gartstein is evidence that ordinary skill in the art would find a reason, suggestion or motivation to use the negative feedback loop of the charge sub-controller (105) in order to minimize losses by utilizing the instantaneous charge value of the cell(s) and the maximum capacity of the cell to continuously optimize the charging conditions.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Yoon by using the discharge sub-controller circuit (102), and/or the charge sub-controller circuit (104) which continuously or intermittently sensed operating parameters and/or physical conditions in order to minimize losses by

utilizing the instantaneous charge value of the cell(s) and the maximum capacity of the cell to continuously optimize the charging conditions.

Accordingly claim 6 would have been obvious.

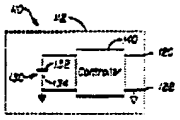


Fig. 4B

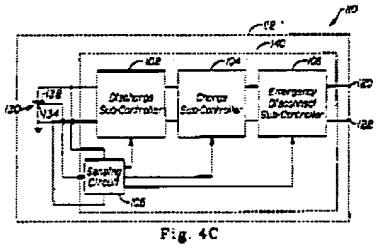


Fig. 4C

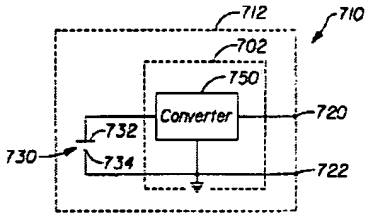


Fig. 7

12. As per claims 7, 9, 10 -13, Yoon differs from the claimed invention because he does not specifically discloses that the control means (10) (applicant's controller) receiving a correction signal representing a damage being done to the electrical storage device.

Gartstein discloses (57-64) that the charge sub-controller (part of the controller circuit 140) (applicant's controller) safely and efficiently controls the charging of the electrochemical cell(s) (130) (applicant' s storage device). He further discloses (col. 13, lines 44-47) that either the discharge sub-controller circuit (102), the charge sub-controller (104), or both may perform the function of the emergency disconnect sub-controller (106) as well. He further discloses (col. 13, lines 11-28; col. 14, lines 4-36) that the sensing circuit (105) also measures physical conditions of the electrochemical cell such as temperature, pressure, the hydrogen and/or oxygen concentration, etc, and

minimizes losses by utilizing the instantaneous charge value of the cell(s) and the maximum capacity of the cell to continuously optimize the charging conditions.

Gartstein is evidence that ordinary skill in the art would find a reason, suggestion or motivation to use the negative feedback loop of the embedded controller (140), which comprises of the charge sub-controller and sensing circuit (105), the discharge sub-controller (102), and the emergency disconnect sub-controller circuit (106) to optimize the charging conditions.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Yoon by using the embedded controller (140) in order to optimize the charging conditions of the electric storage device as per the teachings of the Gartstein.

Accordingly claims 7,9,10-13 would have been obvious.

13. As per claim 8, Yoon differs from the claimed invention because he does not specifically discloses the control means (10) comprising of a feedback loop receiving a feedback signal representing the damage being done. He does not specifically disclose that the voltage-current characterization means (15) generates an output signal such that a charging current is applied more during a first half of a charging period than in a second half.

Gartstein discloses (col. 17, lines 1-8) that the battery (10) is designed to extend its service by maintaining the output voltage of the battery at a level greater than or equal to the cut-off voltage of a given device until the sub-controller shuts down when the voltage of the primary electrochemical cells drops below a threshold level, or when a

rechargeable electrochemical cell can no longer operate, or when a rechargeable electrochemical cell drops to its optimal discharge depth. He further discloses (col. 25, lines 50-67) that the duty cycle of the DC/DC converter controlled by a pulse-width modulation (PWM) is zero when the converter is off, and 100% when the converter is operating at full. He further discloses (col. 26, lines 19-27) that the DC/DC converter may be turned on only when the cell voltage falls to a predetermined level below which the load can no longer operate (during charge), thus meeting the limitation of a charging current is applied more during a first half than in a second half.

Gartstein is evidence that ordinary skill in the art would find a reason, suggestion or motivation to use the pulse-width modulation of the DC/DC controller such as for control schemes and optimization to control the optimizing parameters of the converter.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Yoon by using the PWM of the converter to control the optimizing parameters of the converter as per the teachings of Gartstein

Accordingly claim 8 would have been obvious.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

15. Sonobe, US PAT 6,664,000 discloses a battery pack arranged to make a judgment concerning a loss of functional status.

16. Busson, US PAT 5,252,906 discloses a method of optimizing the charging of a battery of storage cells and apparatus for performing the method..

17. Nor et al.,(Nor) US PAT 5,204,611 discloses a charging circuits for rechargeable batteries and cells.

18. Xia et al., (Xia) US 2002/0120906 discloses a behavioral modeling and analysis of galvanic devices.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to M'baye Diao whose telephone number is 571-272-9748. The examiner can normally be reached on M-Th from 8:00 am to 5:00 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tarifur Chowdhury, can be reached on (571) 272-9819. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

M'baye Diao
Examiner
Art Unit 2112

M.D

TARIFUR CHOWDHURY
SUPERVISORY PATENT EXAMINER